

Application No. 10/524,525
Amendment Dated 8/31/09
Reply to Office Action of 12/30/08

REMARKS

This Amendment is submitted in response to the Office Action mailed on December 30, 2008. Claims 24, 49 and 50 have been amended, and claim 48 has been canceled without prejudice or disclaimer. Claims 24-45, 47, 49 and 50 remain pending in the present application. In view of the foregoing amendments, as well as the following remarks, Applicant respectfully submits that this application is in complete condition for allowance and requests reconsideration of the application in this regard.

Applicant has amended each of independent claims 24, 49 and 50 to delete the recitation of "a source located within the container" so the rejections of claims 24-45, 49 and 50 under 35 U.S.C. §112, second paragraph, are now moot.

Applicant has canceled claim 48 without prejudice or disclaimer so that the rejection of this claim under 35 U.S.C. §102(b) as being anticipated by or, in the alternative, under 35 U.S.C. §103(a) as being obvious over Nakagawa et al., U.S. Patent No. 5,599,743 is now moot.

Claims 24-45, 47 and 49 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Song et al., U.S. Patent No. 6,821,901 in view of Yin et al., U.S. Patent No. 6,270,617 and further in view of Ye et al., U.S. Patent No. 6,270,687. Applicant respectfully traverses these rejections for the reasons set forth below and respectfully requests that the rejections be withdrawn.

In particular, Examiner will note that Applicant has amended claims 24, 49 and 50 to delete the recitation of "a source located within the container." Each of these

Application No. 10/524,525
Amendment Dated 8/31/09
Reply to Office Action of 12/30/08

claims has further been amended to recite that the inductively coupled power is provided by an inductive coupling coil in the form of a cylinder that has a lower edge. The substrate surface is kept at a distance from the lower edge of the inductive coupling coil of at least two times, and preferably at least three times, the mean free path length of the plasma atoms, or at a distance of at least 8 cm from the lower edge of the inductive coupling coil. Support for these amendments is provided at Page 5, lines 19-24 and Page 6, lines 18-29 of Applicant's disclosure, for example, and in the Figures.

As the Examiner will note, in each embodiment of Yin et al. wherein the coil is spaced from the substrate (see FIGS. 22A-22C and 24A-24D), the coil is either flat (FIGS. 22A and 24A) or has a dome shape (FIGS. 22B-22C and 24B-24D). The flat or domed coil shapes are provided in these plasma reactor embodiments of Yin et al. to achieve the desired radial ion density distribution across the wafer. See Col. 13, lines 59-63. As described at Col. 15, lines 52-57 of Yin et al.:

Because the curvature of the dome-shaped ceiling 100 increases the distance of the ceiling 100 from the wafer center, recombination losses at the wafer center are negligible, as indicated by the curve labelled B in FIG. 23. In fact, with the elimination of recombination losses at the wafer center, the reactor of FIG. 22B provides the highest ion density.

Moreover, as described at Col. 17, lines 23-27 and 49-58 of Yin et al.:

Application No. 10/524,525
Amendment Dated 8/31/09
Reply to Office Action of 12/30/08

As alluded to above in this specification, the multi-radius dome shaped ceiling provides the greatest plasma ion distribution uniformity at the wafer (or wafer pedestal) surface compared with other ceiling shapes, other factors being unchanged.

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Also, a large ceiling height (corresponding to a large distance between the RF power absorption region and the wafer surface) produces a center-high ion density distribution at the wafer surface, due to the diffusion of plasma ions toward the center along the greater ceiling-to-wafer distance and the minimization of the RF field near the chamber side wall.

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A multi-radius dome shape produces the most uniform distribution of plasma ion density at the wafer surface relative to other shapes.

In view of the above, Applicant respectfully submits that there is no teaching or suggestion that the cylindrical coil shape of Ye et al. will work in the plasma reactor of Yin et al. since the domed coil shape is required in the reactor embodiments of FIGS. 22A-22C and 24A-24D of Yin et al. to achieve the desired distribution of plasma ion density at the wafer surface. Such a modification of the Yin et al. reactor would destroy the intended purpose and function of the Yin et al. reactor to include a multi-radius dome shape having a coil that is either flat or has a dome shape to achieve the desired plasma ion density distribution at the water surface.

Consequently, Applicant respectfully submits that each of amended independent claims 24, 49 and 50 defines patentable subject matter over Yin et al.

Application No. 10/524,525
Amendment Dated 8/31/09
Reply to Office Action of 12/30/08

taken alone, or in combination with the other prior art of record, and the rejections of these claims should be withdrawn.

Moreover, as claims 25-45 depend from allowable independent claim 24, and further as each of these claims recites a combination of steps not fairly taught or suggested by the prior art of record, Applicant respectfully submits that these claims are allowable as well.

The Office Action fails to set forth a detailed rejection of independent claim 47. While Paragraph 9 of the Office Action indicates that independent claim 47 is rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Song et al. in view of Yin et al., Applicant believes that this is a typographical error since an explanation of the rejection of claim 47 is not set forth in that paragraph. Accordingly, Examiner's allowance of independent claim 47 is respectfully requested.

Conclusion

In view of the foregoing response including the amendments and remarks, this application is submitted to be in complete condition for allowance and early notice to this affect is earnestly solicited. If there is any issue that remains which may be resolved by telephone conference, Examiner is invited to contact the undersigned in order to resolve the same and expedite the allowance of this application.

Application No. 10/524,525
Amendment Dated 8/31/09
Reply to Office Action of 12/30/08

Applicant does not believe that this response requires that any fees be submitted, however, if any fees are deemed necessary, these may be charged to Deposit Account No. 23-3000.

Respectfully submitted,

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